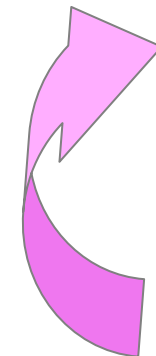
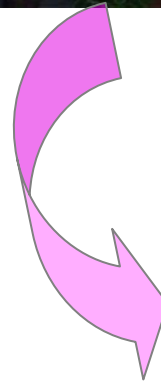


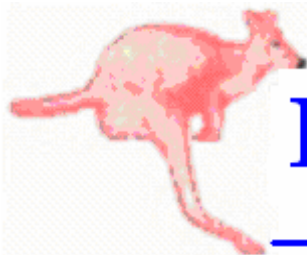
# Value Chain Analysis Report for Morizella Juice

## Final Report

**Prepared by**  
**Kangaroo Limited**  
**Dar es Salaam – TANZANIA**

December 03, 2008





# Kangaroo Limited

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10<sup>th</sup> December 2008

REGIONAL CONTROLLER  
INTERNATIONAL DEVELOPMENT RESEARCH CENTRE  
P. O. Box 62084, 00200 CITY SQUARE  
NAIROBI, Kenya

Dear Sir/Madam

**SUBMISSION OF THE REPORT ON BUSINESS DEVELOPMENT STUDY OF  
INSTITUTE OF TRADITIONAL MEDICINE**

We are pleased to submit our final report on the Business Development Study for Commercialisation of Institute of Traditional Medicine (ITM) at Muhimbili University College of Health Sciences in Dar es salaam, Tanzania as per Contract No. 102564.

The report comprises two semi-independent sub-reports - a Market study and Value Chain Report for Morizella juice produced by ITM as conducted by Kangaroo Ltd.

Each sub-report covers the detailed findings and recommendations. The report covered the Terms of Reference agreed during the inception meeting and subsequent discussions/e-mails between Kangaroo Ltd (Consultants) and Management of IDRC/ITM.

We believe that we have covered all the salient issues; we have also attached our response to some of the raised concern from the presentation of the draft report.

We thank you for the opportunity you gave us to work with you. We await your directives and we remain,

Yours truly  
Kangaroo Ltd

Francis MWIMANZI  
LEAD CONSULTANT

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## ACRONYMS

CBSP	Community Based Seed Production
CHAWAMAMU	Chama cha Waganga Asilia
D&D	Rapid Growth and Development of Commodity
DADPS	District Agriculture Development Plans
DALDO	District Agriculture Livestock Development Officer
DSM	Dar es Salaam.
FCC	Fare Competition Commission
GAP	Good Agricultural Practices
GCC	Government Chief Chemist
HIV/ADIS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IGAs	Income Generating Activities
ITM	Institute of Traditional Medicine
KIFONET	Kibaha Food Processors network
MSEs	Medium and Small Scale Enterprises
NGOs	None Government Organizations
QDS	Quality Declared Seed
SMS	Subject Matter Specialists
SPS	Sanitary and Phytosanitary
SUA	Sokoine University of Agriculture
TBS	Tanzania Bureau of Standards
TFDA	Tanzania Food and Drugs Authority
TFNC	Tanzania Food and Nutrition Centre
TIRDO	Tanzania Industrial Research Development Organisation
TTCL	Tanzania Telecommunications Company Limited
UDSM	University of Dar es Salaam
VAO	Village Agricultural Officer
VC(A)	Value Chain (Analysis)
VEO	Village Executive Officer
WEO	Ward Executive Officer
WW	Wet Weights

## EXECUTIVE SUMMARY

### 0.1 Background

This report presents findings of Morizella Juice value chain study that took place in Coast and Dar es Salaam Regions specifically in Kibaha and Bagamoyo districts. The study is intended to assess the entry strategy for commercialization of Morizella Juice now produced at lab scale by the Institute of Traditional Medicine (ITM) of Muhimbili University of Health and Allied Science (MUHAS).

Combinations of approaches were used to conduct the study. The entry point was a kick start meeting with ITM staff at their head office. Thereafter the team undertook literature review and internet search on Moringa, Rosella, geography of Coast Region and food supplement business. A field work was undertaken at Kongowe area, Kibaha district and Chalinze area, Bagamoyo district. Data was collected through focus group meetings, interviews with individual respondents and observation especially at the farm level.

**Note:** Upstream value chain segment activities (Morizella juice marketing) has been studied and reported separately through a market survey.

### 0.2 Key Findings

**Size of farms:** Within the study area Rosella and Moringa are produced by smallholder farmers at an average of less than one acre per household, the potential farm size is estimated to be 10 acres per household. About 50 farmers are currently cultivating Rosella in the study area. Most of these farmers also cultivate Moringa. There is also a potential for large scale farmers (with about 100 acres) who are ready to use their land for Rosella and Moringa production provided they are assured of the market.

**Markets:** Dar es Salaam is largest urban market for dry Rosella and Moringa materials and Morizella Juice. No export was reported by farmers for dry Rosella calyces and Moringa leaves. The products are used as food supplement or for medicinal purposes.

**Economic viability:** This study has established that Morizella juice processing has a market potential and that raw materials can be obtained within Coast Region. If commercialization interventions are undertaken and constraints are addressed by key actors the project is economically, financially and technologically viable. The main opportunities and constraints include:-

**Opportunities:** There are favourable factors for improvement of the value chain both in demand and supply side which include;

- Presence of imports of food supplements worth about Tshs. 1.6 billion per annum signify presence of strong demand for food supplements including Morizella;
- Demand for Morizella juice is estimated to be about 20 million litres per annum with a projected uptake of 2% for low income, 5% for middle income and 10% for high income households;

- There is availability of land for expansion, suitable climatic condition and possibility for irrigation provides an opportunity to produce Moringa and Rosella products throughout the year;
- There is increased knowledge about producing organic products, which may interest international buyers;
- ITM has invested in a larger (500 kg per batch) drying facility at Kibaha as part of the preparations that will help to improve availability and quality of raw materials for Morizella juice;
- There is a goodwill from ITM which is a reputed medical institution inside and outside Tanzania; and
- Donor interest and support especially IDRC who have funded this feasibility study phase that is critical to ascertain viability of the project.
- A partner with the necessary equipment and capacity has been identified though formal legal interactions are yet to begin pending the business plan.

**Constraints:** A number of challenges face the value chain, the principal ones are as follows: -

- **Marketing Access:** Limited market options for Moringa have discouraged most Moringa farmers. There is lack of stable Rosella market which affects a number Rosella farmer. There is lack of relevant market and price information, especially to farmers.
- **Poor farming practices:** Farmers are not following proper crop husbandry (land preparation, seed spacing, weeding and harvesting) results into low productivity (now at about 40% of the recommended yield) hence low income. Also crop production is rain-dependent.
- **Limited education of organic farming:** Farmers don't follow organic production practices of Rosella which is essential for environment-sensitive consumers.
- **Weak farmer groups:** Farmer groups in the study area are weak therefore less effective in addressing market, financial and technical support needed.
- **Lack of input from research institutions:** There is no sustainable R&D input into Rosella/Moringa farming though there is an agricultural research centre in Kibaha and Sokoine University in Morogoro.

**Channels:** Five channels were identified as follows: -

*Channel 1:* Composed of flow of dry Rosella calyces and Moringa leaves from farmers to individual consumers at households. The markets are in Dar es Salaam, Moshi and Arusha. This channel is the largest channel 70% of all dry weight of Rosella calyces produced.

*Channel 2:* Involves farmers who sell dry Rosella and Moringa leaves to local trader in the local market they make 27%. The dry materials are distributed through two routes; 98 % is direct sold to consumers and 2% are sold through kiosks and supermarkets in town particularly in Dar es Salaam.

*Channel 3:* is derived also from channel 1, where 3% of total sun dried materials are sold to the Morizella **processing** plant.

*Channel 4:* This channel originates from channel 3 where Morizella Juice is manufactured. About 10% of juice is sold through clinics and dispensaries e.g. Upendo dispensaries in Temeke and Hallelujah Santarium Clinic in Magomeni. However, given a good marketing and promotion strategies, channel 4 has a potential for expansion and grow in both local and international markets.

*Channel 5:* Currently, there is a group of informed consumer who has access to the manufacturing plant who do a direct purchase of Morizella juice for their personal daily use for medical purposes and as food supplement. So far, it is the largest marketing channel of Morizella juice produced (90%).

Two of them have a potential for growth and expansion. The potential channels are Channels 2 and 4 have the potential for expansion if an appropriate promotion strategy is implemented. Channel 4 has a potential for expansion and growth in both local and international markets.

**Points of Leverage:** In order to improve the value chain the interventions are required at the following nodes (points of leverage)

- *Morizella juice production plant:* ITM should increase production by acquiring technology for commercial production of juice, through a pull-effect, higher demand for Rosella/Morisella will stimulate on-farm production.
- *Dryers:* Increased production of the juice requires reliable and quality supply of inputs, centralised drying facility/ies are recommended. ITM has already invested in a dryer with a capacity of 500kgs-wet weight (throughput). The facility supports production of Morisella juice equivalent to ... million litres per annum. The demand estimate indicates that about 20 million litres (liquid equivalent) of juice can be absorbed by the market. There will be a need for more dryers to tap into the potential market.
- *Farm Production:* Farmers need to be organized and educated to achieve the following; access to extension services, production of adequate quantity and quality raw materials, economies of scale in transport, etc. Strengthening of farmer groups will enable ITM to reach a large number of targeted farmers in a single intervention and benefit from collective accountability.

### 0.3 Recommendations

It is recommended that ITM in collaboration with other actors should zoom in improving two priority key issues namely; improvement of Research and Development on one hand and on the other, improving production and productivity of Rosella and Moringa. The proposed strategies are: -

- **Improving Market Access:** Issues to do with marketing have been addressed in the market study submitted along with this value chain analysis.
- **Improving good farming practices (GAP):** Through groups farmers can cost – effectively improve access to extensions services and technologies. It is anticipated that once organized farmers can attract the attention of BDS in various areas including extension services from DALDO, food processing technologies from such organizations as ITM, SIDO, etc, food processing and marketing skills and support from Tanzania Food



Processors Association (TAFOPA), credit services from Kibaha-based micro-finance institutions (MFIs) such as SIDO, Presidential Trust Fund, etc.

- **Emphasis on education of organic farming:** Farmers being supported by ITM are expected to produce organic products (loosely used), there is a need to continue with education on organic farming and self-initiated and enforced measures are agreed and implemented. Market expansion for Morisella is expected to have direct benefit to Rosella and Moringa farmers. There is room for the market above ITM needs.
- **Mobilising and strengthening farmers groups:** There is need to mobilize and train farmers on group dynamics, group leadership and business management focusing on the anticipated business growth. This may include a study tour to successful groups operating outgrower/contract farming arrangement. It has to be understood that nurturing farmer groups is a process that requires special skills and time.
- **Input from research institutions:** In the immediate and perhaps in the medium-term Rosella and Moringa may not need critical R&D as the crop has no serious on-farm pests. Over time it may become prone to pests, to minimize the risk, ITM should seek a window at Sokoine University to keep an eye on agronomical issues of the two crops.

#### 0.4 Possible business risks and Mitigation

The development of the value chain may face the following risks: -

- **Unsyncronised interventions:** Interventions at the points of leverage above need to be phased carefully to minimise the risk associated with one segment being not ready at the time when other segments have committed their resources. This is even more critical with smallholder farmers.
- **Lack of trust in the value chain:** Many chains have broken because of mistrust among actors. ITM wielding more power in the chain must ensure that actors are adequately informed about what is happening in the chain.
- **Overdependence on out growers:** Good practice in contract farming requires that the processor should hedge against the risk of out growers not honouring the contracts/agreements. ITM should have a contingency plan to fill the gap in case of disputes with out growers.
- **Oversupply of Rosella/Morisella:** ITM should have a vision of expanding its market outside Tanzania to be able to absorb more Rosella and Moringa to help broaden the impact of poverty reduction with farmers.

## **1.0 INTRODUCTION**

### **1.1 Objective of the Study**

The scope and expected output of the sub sector or value chain analysis is basically to highlight the dynamics of sub sector in terms of:

- Actors, roles & interrelationships
- Factors affecting the growth and competitiveness (constraints & opportunities) of the various supply channels
- Market analysis (global, regional & national) in terms of critical success factors
- Analysis of governance and economic benefits
- Identification of potential business solutions that will address constraints and tap the opportunities.
- Selection of key services and analysis of demand and supply side of such services to come up with recommendations of strategies for value chain upgrading (implementation)

The result / or findings of Morizella Juice value chain study are concentrated on the identification of;

- Channels and dynamics of Morizella Juice and related products for commercialization for national markets.
- Commodity driving force in commercial commodity development,
- Policies and regulations that facilitate commodity development and growth.
- It highlighted the key point of leverages for interventions and recommendations.

### **1.2 Methodology**

Primary data was collected through focus group and individual interviews while secondary data was collected through literature search including the Internet, sourcing of data/information from Institute of Traditional Medicine, Tanzania Bureau of Standards (TBS), Government Chief Chemist, Tanzania Drugs and Food Authority (TDFA) and College of Engineering and Technology -University of Dar es Salaam on machinery processing.

Interviews were done with ITM staff at farm level, farmers, local traders, and processors, District Agriculture Livestock Development Officer's in Kibaha and Bagamaoyo in Coast region. As for market upstream market functions (see a market study report).

#### **1.2.1 Study Areas**

The survey areas were Kibaha and Bagamoyo districts in Coast Region. The two areas were selected because currently they are the main source of raw material for ITM (i.e. Rosella and Moringa) for Morizella juice while Dar es Salaam is the major market of Morizella juice. Table 1.2 below depicts the visited areas.

*Table 1.2: Study Areas*

	<b>Kibaha District</b>		<b>Bagamoyo District</b>	
	<b>Production</b>	<b>Market</b>	<b>Production</b>	<b>Market</b>
Rosella (calyx)	Kongowe, Mlandizi	DSM	Chalinze	DSM
Moringa (leaf power)	Kongowe, Mlandizi	DSM	Chalinze	DSM

*Source: Field Survey*

Thirty smallholder farmers were involved in the survey through focus group meetings and individual interviews. The study also covered two processors cum traders of Moringa and Rosella.

### **1.3 Structure of the Report**

The report is divided into eight chapters. Chapter One gives the introduction of the study, its objectives and context framework. Chapter Two provides the overview of the Morizella sub-sector. The mapping of Morizella value chain (structures of the sub sector) and its linkages/relationships are presented in Chapter Three. Gross margin analysis at the level of various actors in the value chain is provided in Chapter Four. Chapter Five is about governance and services. Institutional and regulatory framework is discussed in Chapter Six while constraints and opportunities for sub sector/value chain development are analyzed and presented in Chapter Seven. The conclusions and recommendations are presented in the last part of the report under Chapter Eight. Note that tables and figures have been numbered according to chapters under which they appear.

## 2.0 OVERVIEW OF THE SUB SECTOR

### 2.1 Moringa and Rosella Crops

#### 2.1.1 Moringa Tree and its Products

Literature indicates that the Moringa tree originated in Northern India some 5,000 years ago. Then it spread from India to other tropical and subtropical areas in the world (i.e. Africa, Asia, South America, Central America and Caribbean) and it adapted to local conditions over time. The scientific name for this tree is *Moringa Oleifera*. There are thirteen (13) known Moringa species, the species are, *M. oleifera*, *M. arborea*, *M. borziana*, *M. concanensis*, *M. drouhardii*, *M. hildebrandtii*, *M. longituba*, *M. ovalifolia*, *M. peregrine*, *M. pygmaea*, *M. rivaie*, *M. ruspoliana* and *M. stenopetala*. The focus of this study is on *Moringa oleifera*.

Fig. 2.1 Moringa Plant

**In traditional medicine:** Literature indicates that traditional medicine knowledge existed in many different parts of the world including Africa, Latin America, South America, India, Indonesia, and many island nations. In ancient times, Moringa products are used as treatment various sickness and diseases, such as fever, landular swelling, gonorrhoea, headaches, hysteria, intestinal worms, jaundice, lactation, Malaria, pain in joints, pimples, pregnancy, psoriasis, respiratory disorders, scurvy, semen deficiency, skin infections, sore throat, sores, stomach ulcers, Tuberculosis, tumour, urinary disorders and wounds.



#### **Nutritional value of Moringa leaves**

Scientists have examined the nutritional value of Moringa leaves and has concluded the following; Moringa contains seven (7) times the Vitamin C of Oranges, four (4) times the Calcium of Milk, three (3) times the Potassium of Bananas, two (2) times the Protein of Yogurt and four (4) times the Vitamin A of Carrots, minerals like Phosphorous, Vitamin B1, B2, B3, Chromium, Manganese, Iron, Copper, Zinc and Magnesium. It also rich in essential amino acid, which is the building blocks of proteins.

### 2.2 Rosella Crop

Rosella originated from Northern and Central Africa countries and then spread to other tropical and sub tropical countries. Scientific name of rosella or Roselle is called *Hibiscus sabdariffa*. There are more than 300 species of hibiscus which are distributed in tropical and subtropical regions around the world. The main characteristic of *hibiscus sabdariffa* (Rosella) is:-

- The flowers have both male and female organs. Seedpods, as shown in Fig. 2.2 are enclosed in their red, fleshy calyces which are commonly used for making food and tea.
- Roselle belongs to Malvaceae family. It is an erect, mostly branched, annual shrub. Stems are reddish in colour and up to 3.5m tall. Leaves are dark green to red. Flowers are red to yellow with a dark centre containing short-peduncles.

**In traditional medicine:** Rosella is valued for its mild laxative effect and for its ability to increase urination, attributed to two diuretic ingredients, ascorbic acid and glycolic acid. Because it contains citric acid, it is used as a cooling herb, providing relief during hot weather by increasing the flow of blood to the skin's surface and dilating the pores to cool the skin. Rosella can be used as antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, diuretic, emollient, purgative, refrigerant, resolving, sedative, stomachic and tonic. Rosella is a traditional remedy for abscesses, cancer, cough, debility, dyspepsia, dysuria, fever, hangover, heart ailments, hypertension, neurosis, scurvy, and strangely, alcoholics.

Fig. No. 2.2 Rosella Tree



**Nutritional value of Rosella:** Red calyces contain antioxidants including flavonoids, gossypetine, hibiscetine and sabdaretine. Also it is rich in riboflavin, ascorbic acid, niacin, carotene, calcium, and iron. The food value of rosella calyces varies from country to country. In central Africa the values are as in table 2.1.

Table 2.1 Food Value per 100g of Edible Portion (Calyces Fresh)

Type	Unit
Moisture	9.2g
Protein	1.145g
Fat	2.61g
Fibre	12.0g
Ash	6.90g
Calcium	1,263mg
Phosphorus	273.2mg
Iron	8.98mg
Carotene	0.029mg
Thiamine	0.117mg
Riboflavin	0.277mg
Niacin	3.765mg
Ascorbic Acid	6.7mg

### 2.2.1 Farming systems

Rosella tolerates a warm and humid tropical and sub-tropical climate, and is susceptible to damage from frost. Roselle can tolerate little shade and can be grown in greenhouse but it normally grows best in field conditions under the full sunlight.

## 2.3 Background of the Study Area

### 2.3.1 Location

**Kibaha district:** The district covers an area of 1,812 km<sup>2</sup> (5.4%) of total Coast Region's land. Some 1,290 km<sup>2</sup> are arable, the area under cultivation is 63,034 ha (2%) of total arable land. The total population of the district is 131,242 inhabitants of which 51 % are female.

**Bagamoyo District:** Covers an area of 9,842 km<sup>2</sup> (29%) of total Coast Region land, out of these 836,570 ha are arable land and area under crop cultivation is 75,360 ha 7% of total arable land. According DALDO, 97% of the arable land is not utilized giving a room for expansion of farming activities. About 85% of population is small-scale farmers; the average farm size is 1 ha. Main food crops grown are; maize, paddy, sorghum, cassava, sweet potatoes legumes, vegetables and fruits. These crops are also used as cash crops; other major crops are cashew nuts, coconuts, and sweet pepper (Region profile. 2007).

### 2.3.2 Climatic features

The Regional profile meteorological statistics indicate that the average temperature for the region is 28<sup>0</sup> C. and average rainfall is between 800mm to 1,000 mm per year. Long rains (heavy) on average cover three months (90 days) between March to May while short rains occur for two months from mid October to mid December. Long rains are used to cultivate crops that require more moisture such as paddy, maize and cotton. Short rains are used for crops that need less moisture including pulses and vegetables. Rosella is cultivated in both short and long rains. The Coast Region climate is suitable for growth of Rosella and Moringa.

### 2.3.3 Topography, soils and drainage

Bagamoyo District is in the coastal belt (0 – 100 meters above the sea level). The soils are sandy loam and heavy clay water logged suitable for paddy. Kibaha District is in the highland plateau (100 – 480 meters above sea level) common soils are sandy loam and sandy clay. Mild sandy soils are suitable for Rosella, it does not do well in water logged soils. The drainage system is based on rivers and among them is Rufiji, Wami and Ruvu rivers, they are among the largest rivers in Tanzania. The rivers offer a potential for irrigation.

### 2.3.4 Production Cycle of Rosella

**Land preparation:** is done by hired tractors and casual labour. A few farmers use hand hoe, simple tools like axes, 'pangas' and family labour. Land preparation is done immediately after Rosella harvests. In the first season (short rain) land preparation is done in October and early November.

**Planting:** Well prepared land is necessary. The quantity of seed needed per hectare ranges between 11 and 22 kg depending soil types. Standard planting measurements

are 15 cm width x 15 cm length x 0.5 cm (depth). On planting, seeds are either directly broadcasted on the farm or using a seedbed/nursery then transplanted. Both methods are used, however, for better results using seedlings is recommended.

**Weeding:** Regular weeding is required for better plant nutrient supply but also to reduce shades and allow more light particularly during flowering.

**Fertilization/Pesticide:** inorganic fertilizers are not commonly used in the study area. Use of nitrogen is common in India. The scale is 80kg N/Ha, 36-54kg. Crop rotation cultivation method is applied to avoid pest that affect roots (root knot nematode).

**Yields:** According to farm records in Kibaha district one acre are planted with 4489 plants it yields 799.042 kgs of wet weight. One plant is equivalent to 0.178kg wet weight or 0.038 kg dry weights. Under good condition one plant produces 1.5 to 7.5 kg of wet weight. This is equivalent to 6733.5kg wet weight 33667.5kg of dry weight.

**Harvesting:** Rosella fruits are harvested when full –grown but still tender i.e. 21 days after commencement of flowers. At this stage, flowers are easily snapped off by hand. They are easier to break off in the morning than at the end of the day. If the harvesting is overdue when the stems have toughened, knives are used. The harvesting of seed takes place when fruits have matured.

The costing relating all activities from production to harvesting are illustrated in Annex II.

*Table 2.2 Rosella Production calendar (cycle) in Bagamoyo and Kibaha Districts*

Month	Activity	Seasons
Oct	Land preparation	Short rains
Nov	Planting, manure application	
Dec	Weeding	
Jan	Weeding	Dry season
Feb	Harvesting	
Mar	Harvesting	
Apr	Land preparation	Long rain season
May	Planting	
June	Weeding	
July	Weeding	Cool season
Aug	Harvesting	
Sept	Harvesting	Dry season

*Source: Field survey*

**Processing (drying):** There are two types of drying Rosella calyx at household level either solar or sun drying. Interviewed farmers reported that the common drying method is sun drying. Solar drying is used during training demonstration. However it was reported that solar dryer method is better because it helps the products to retain all the nutrients. It is recommended that Rosella calyx should be subjected to drying within 3-4 hours after harvest. This implies that there has to be an efficient transport system between the farm and the drying point.

**Packaging and Storage:** Farmers reported that dried Rosella calyx is commonly packaged in 50kg jute bag and stored in clean place in the house/or store before delivering to the nearest market.

**Land Availability:** Farmers in the area acquired their land through two major alternatives; buying or inheriting from parents. Land availability issues were also highlighted by government officers at district level. Both Kibaha and Bagamoyo District Agricultural Livestock Development Officer's indicated that there is a possibility of land acquisition provided proper procedures for land ownership is followed.



### 3.0 STRUCTURE OF MORIZELLA JUICE SUB SECTOR

#### 3.1 Sub sector Mapping

The sub sector Map presents schematic way that the product flows through different channels from production to the markets, it describes a set of related businesses and channels in the sub sector. It identifies the sub-sectors' principal functions, participants and ascending channels. The functions describe the transformations that take place or activities performed in moving the produce or product from production to markets. The participants indicate who performs the related transformation or activities. The ascending channels illustrate how products flow among participants, who buys from and how the network hangs together. The structure of Morizzela Juice Map is presented in *Figure 3.1*.

##### 3.1.1 *Ascending Channels of Morizella juice*

**Channel 1:** is composed of direct route from farmers to individual consumers of dry matter of Rosella calyces and Moringa leaves. The consumer markets are in Dar es Salaam, Moshi and Arusha. This route is the largest account of 70% of all dry Rosella calyces produced in the study area.

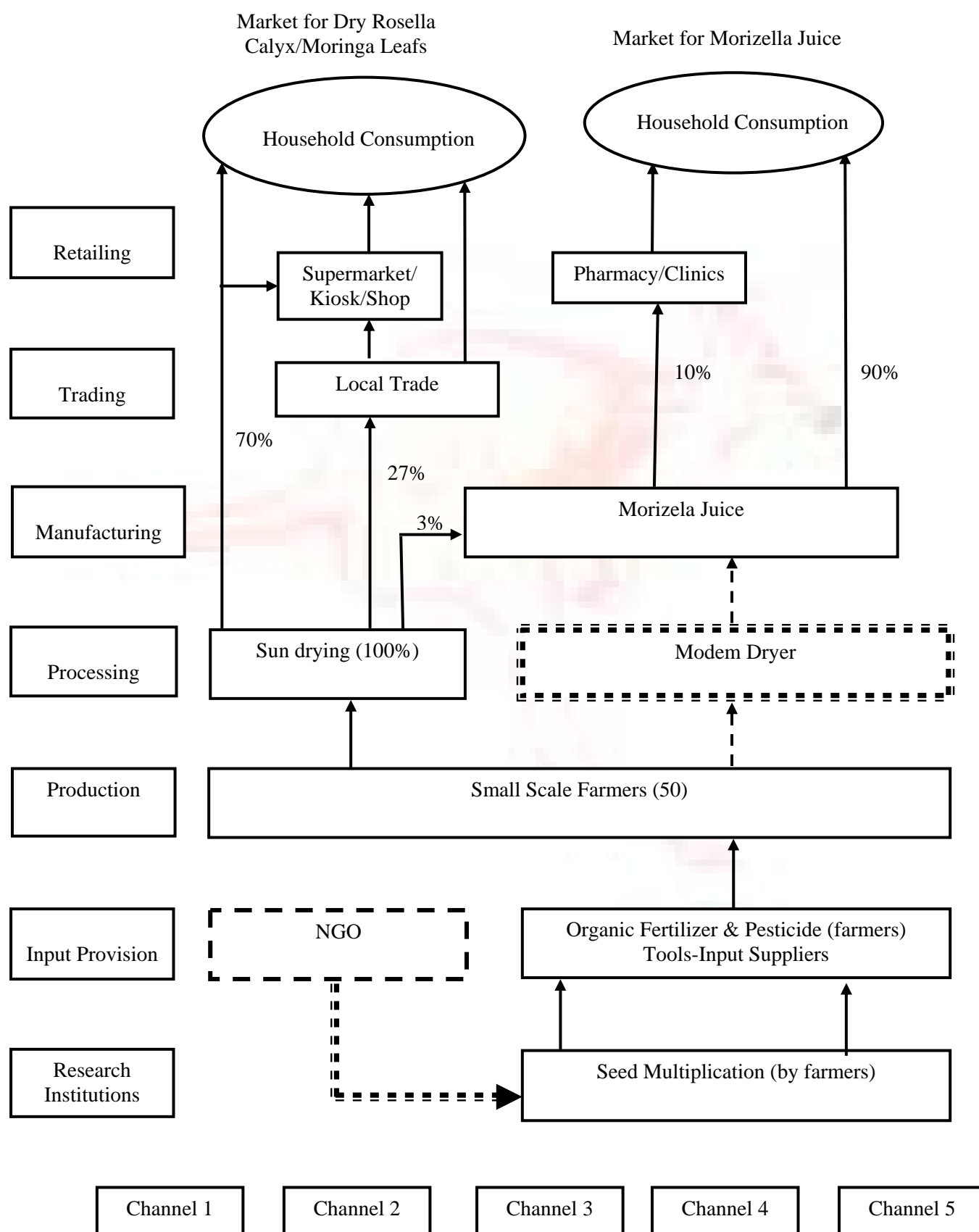
**Channel 2:** Originated from channel 1 where 27% of sun dried product is sold as dry Rosella and Moringa leaves to local trader in the local market. These products are sold in two ways; 98 % are direct sold to consumers and 2% are sold through kiosks and supermarket in town particularly in Dar es Salaam.

**Channel 3:** is derived also from channel 1, where 3% of total sun dried materials are sold for Morizella juice production.

**Channel 4:** This channel originates from channel 3 where Morizella Juice is manufactured. About 10% of juice is sold through clinics and dispensaries e.g. Upendo dispensaries in Temeke and Hallelujah Sanatorium Clinic in Magomeni. However, given a good marketing and promotion strategies, channel 4 have a potential for expansion and grow in both local and international markets.

**Channel 5:** Currently there is a group of informed consumer who do directly purchase Morizella juice for their personal use as food supplements. So far, it is the largest marketing channel of Morizella juice produced (90%).

Figure 3.1 Morizella Juice Sub sector Map



### 3.1.2 *Functions and Participant (Actors)*

This section will look briefly at each function in the value chain (depicted on the left side of the value chain map) as well as the actors.

**Research and Development:** At present, there is no agricultural research station in the country which deals with Rosella and Moringa seed multiplication. The seed multiplication is done by farmers. Optimal Africa Company introduced Moringa seed in 2001 to 2006 while Rosella seed was introduced by ITM in 2006. It was reported that ITM and Optimal Africa used to provide extension service and training for the Rosella and Moringa sector respectively. The government officials at district level reported that the office does not have outreach activities, or links to extension activities of both crops because the crops are categorized as new. District Agricultural Livestock Development officers in both districts indicated that, Rosella and Moringa would be included in the district development plans (DADP's) if the farmers in related village level identified these crops as their priority for government assistance.

**Input Supply:** The major inputs for smallholder of rosella and Moringa production are seeds, tools, fertilizers and pesticides. There are no commercial or community nurseries for rosella and Moringa who produces these seeds for sale. Most farmers obtain seeds and planting material from their own or neighbouring farms. There are various fertilizer/input supply companies in Dar es Salaam, located at Kariakoo market. Stockist or local kiosks and retail stores are available in Kongowe and Chalinze area. Farmers typically buy their tools from these small retail operations in nearby towns. But access to inputs is limited for more remote rural farmers. Fertilizers and pesticides were reported that is not commonly applied in production of these crops. Manure/ compost manure are applied for soil fertilization whenever required and Neem tree leaves / seeds and other medicinal trees are used for treatment of pesticides.

**Rosella and Moringa Production:** There are approximately 50 smallholder farmers in Kongowe – Mambas village and Chalinze--village producing rosella calices. Average yield per acre is around 7042 wet weights (ww) of rosella calyx which is equivalent to 134.67 kilograms per acre of dry weight (ww).

**Pests and Diseases:** The rosella crops can be attacked with lot pests and diseases, the diseases that attack cotton plants e.g. root borers, called Heloverda radialis. Traditional pesticide treatments are commonly used. It was reported that farmers are using biological means of control e.g. application of Neem tree leaves and seeds

**Out grower farms:** ITM out growers leased plots are unattended. Interviewed farmers reviewed that in the first year (1<sup>st</sup> & 2<sup>nd</sup> season) all plots were well attended but stopped in the second year (both season) because ITM failure to provide contract as per their first promise. Rosella production of other small scale farmers who are out of ITM arrangement/ or scheme are well managed. The market of dried rosella are two; local trader and urban consumers in Dar es Salaam, Arusha and Moshi.

**Organizations of actors:** There are four groups involved in Rosella production, they are: -

- Kibaha Food Processors Network (KIFONET) which is based in Kongowe<sup>1</sup>
- Chama cha Waganga Asilia(CHAWAMAMU). This is an association of traditional doctors based in Kongowe, it has 18 members;
- Kilimo Hai Kibaha. The group promotes organic farming in Kibaha, it is based at Kibaha town and has 10 members;
- Rosella Women Groups is based in Kongowe, it has 7 members;
- Kivota Women Group is based in Chalinze, it has 12 members.

Two of the groups above are women groups. Apart from farming activities, the women are also engaged in other income generating activities (IGAs). None of the farmers reported to be a member of any SACCOS.

**Harvesting:** Rosella fruits are harvested when full –grown but still tender. Harvesting is done by men, women and youths. The job is labour intensive and it is important to anticipate possible shortage of labour when Rosella farming is expanded. The most effective strategy would be for Rosella farmers to offer a competitive rate for casual labourers. The market rate for casual labour is Tshs 2,000 and 3,000 per day.

**Processing:** The major activity after harvesting is drying, there are two types of drying that is sun drying and solar drying: -

**Sun drying technology:** Few hours after harvesting Rosella calyx are exposed to direct sun. Drying process takes 2 to 3 days depending on the weather and temperatures. Drying is mainly by sun rays, the produce are dried on elevated place, on mat and other traditional materials. Shelf life of well dried Rosella calyx and Moringa leaves is more than a year.

**Solar drying technology:** In the study area there are three solar driers normally used during training and demonstration to farmers. The equipment was acquired from Tanzania Industrial Research Development Organization (TIRDO) and Kwanza Collection. The dryers' capacity is 20kg per batch for three days. Interviewed farmers indicated that they will prefer to do solar drying but the problem is availability and access to solar facility. To solve drying problem, it was reported that ITM is in the process of installing a big dryer with the capacity of 500kg wet Rosella calyx. The plant will dry Rosella from out growers; this will also improve prices and quality.

**Trading:** Farmers sell to ITM or local trader at the farm gate or directly to urban market in Dar es Salaam, Arusha and Moshi. While there could be a number of benefits of farmers could sell the products collectively, they are operating individually with very little horizontal linkage. As a result, farmers are not able to finance the purchase of inputs. Farmers and local traders have limited access to working capital loans, most of them rely on their own resources to finance their working capital needs. In most case farmers sort the rosella into two grades (i.e. good and bad) according to colour and the physical appearance of dried Rosella calyx. Other standards such as pesticide residue or production conditions are not taken into consideration. If the dry Rosella calyx is sold at the farm gate the traders grade the produce before buying. But

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<sup>1</sup> The number of its members was not be established during the study

if the farmers go to the market themselves they grade before selling. It was reported that farmers at Mwamisi village in Kongowe village sell good grade at 5,000/= per kg of dry calyx. Before their closure Optimal Africa and Phytonic Alphara Company used to buy and export Moringa products.

**Juice production:** Morizella juice is produced by the Institute of Traditional Medicine which is located at Muhimbili Hospital in Dar es Salaam. ITM sources raw materials from its farm hired out to out growers from Mwamisi Village in Kongowe Kibaha. Other inputs such as bottle and label are obtained in Dar es Salaam. Main raw material is Rosella calyx, dry Moringa leaves, sugar.

**Retailing:** Consumers of dry Rosella calyx and Moringa buy directly from farmers, retail markets, kiosks and supermarkets (especially Imalaseko and Shoprite). Direct purchases may account for about 70 % of total dried matter while 30% is purchased through local traders. Another retailing activity is done when Morizella juice is sold at juice production point i.e. at the ITM lab. It was reported that dry Rosella calyx and Moringa powder have a potential for export and that in early 2000's Optima Africa and Phatonic Alphara based in Chalinze used to export Moringa products<sup>2</sup>.

### **Business Development Service Providers**

Apart from ITM, there are no NGOs that are actively in support of Moringa value chain in the study area. Potential BDS is SIDO; it has experience and capacity to provide services to farmers. Other potential partners are Tanzania Food Processors Association (TAFOPA) on support farmers in improving processing and marketing of Rosella/ Moringa products. At present no SACCOs is attending the Rosella/ Moringa farmers. Since the drying plant is about to be commissioned, it will form the central point where initiatives to support farmers establish their own SACCOs or join existing ones will take place. Education on SACCOs should be part of the support from the DALDO through Cooperative department.

## **3.2 Dynamics of Morizella Juice**

### **3.2.1 Driving forces of a value chain**

There are various forces that are driving the dynamics of the value chain. They include ranging; market prices, weather, productivity, technology risks, and barrier to entry, firm behaviour, input supply and policies. Three major driving forces are discussed hereunder.

#### **(i) Weather**

Rosella and Moringa are known to do well in moderate climate conditions they can tolerate dry weather to same extent. There is little risk in the study area of weather factor affecting production of raw materials. Irrigation can improve yield and guarantee supply throughout the year. However irrigation could be new dimension in the project which is expensive.

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<sup>2</sup> Some information indicates that Optima Africa was not able to export Moringa products because of low quantity.

**(ii) Barriers to Entry**

Essentially the Rosella/Moringa industry is less developed; the main barrier has been limited market volume. Introduction of Morizella juice will attract new entrants at the level of raw material supply. Upstream, the key barriers are technology market promotion and economies of scale. ITM will have the largest production facility hence economies of scale that can't easily be copied. Competitors may lack the goodwill that ITM enjoys, this will to some extent give ITM a competitive advantage over of new entrants as Morizella will be backed by strong ITM image and R&D facilities and human resource.

**(iii) Input Supply**

There is no institution that is currently involved in R&D for Morizella ingredients such as seed multiplication, pesticide management, farm management, harvesting and post harvest handling. ITM should seek the collaboration of agricultural research institution such as SUA and Kibaha Sugar Research Institute (who are close to production areas) to work together to support the crops. Inputs used to manufacture and package is vital for quality and appearance of the product in the market. High quality and good looking products normally command higher prices in the market. To achieve this, ITM needs to improve processing equipment, preservatives, raw materials (Rosella calyx and Moringa leaf). Also, it should improve the packaging material and labelling.

**2.3.3 Potential Points of Leverage**

There are three identified source of leverage in Morizella Value Chain as indicated below: -

**Rosella drying facility:** Installed processing factory (modern dryers) at Mwambisi village – Kongowe in Kibaha district is a key point of leverage in Morizella Value chain. It is a system node that will impact on production volume of Rosella and Moringa at farm level, and simultaneously the volume of juice manufactured as indicated in table 3.1 and Table 3.1.1 below. Installation of a centralized drying facility will have an impact on availability of raw materials i.e. Rosella and Moringa. To meet the needs of one 500kg wet weight dryer area under cultivation for Rosella will have to increase by 50% from 50 acres to about 75 acres. With the above assumptions, the juice processing plant will bottle total of 2,526,894 bottles per year equivalent to estimated revenue of Tshs. 1.3 billion. The impact may double if another facility is installed.

*Table 3.1 Estimate of Impact of Rosella Drying Facility per Annum*

Item	Unit	One Dryer Value	Two Dryers Value
Throughput Capacity per batch	Kgs	500	1,000
Process period per batch	Days	2	4
Number of batches per year	Batches	150	300
Conversion ratio - wet - to - dry		16.8%	0
Capacity per batch of dry weight		84.23	168

Litres of juice per dry weight	Litres/kg	100	200
Litres juice of per batch	Litres	8,423	16,846
Litres per annum		1,263,447	2,526,894
Volume of juice bottles	Mililitres	500	500
Number of bottles per year	Bottles	2,526,894	5,053,789
Ex factory price per bottle	Tshs	500	1,000
Ex factory price per litre	Tshs	1000	2,000
<b>Revenue per annum</b>	<b>Tshs</b>	<b>1,263,447,249</b>	<b>2,526,894,499</b>

*Source : Field Survey*

Installation of a centralized drying facility will have an impact on availability of raw materials i.e. Rosella and Moringa. To meet the needs of one 500kg wet weight dryer area under cultivation for Rosella will have to increase by 50% from 50 acres to about 75 acres. With the above assumptions, the juice processing plant will bottle total of 2,526,894 bottles per year equivalent to estimated revenue of Tshs. 1.3 billion. The impact may double if another facility is installed.

**Farmer group organization:** Farmer groups in the area are weak, they need to be strengthened. They are poorly organized, they lack entrepreneurial approach to their businesses as well as inadequate market information with regard to demand, quality, branding and prices. There is no linkage with financial institutions e.g. banks and SACCOS operating in the districts.

**National and international regulations:** Both national and international regulations have an important role in improving acceptability and prices of a product traded in local and international markets. These regulations include those of quality from farm level all the way to the end consumer level in local and international markets. Critical aspects include techniques and rules of organic farming to retain the organic status of the products, aspects of traceability, and sorting and grading it is also useful to introduce good agricultural practices (GAP) to farmers from the outset.

## 4.0 GROSS MARGINS ANALYSIS

### 4.1 Gross Margin

The key costing items include transactions of services occurred during production, processing, transportation, trading and marketing. Services provided from point of production to retail include nursery preparation, land preparation, purchase of inputs, planting, weeding, spraying, harvesting, packaging, loading/unloading, transport from farm to collection point, and collection point to markets.

#### 4.1.1 *Gross margin at farm gate*

When the interventions have been done, it is expected that farmers' margin per hectare will increase from Tshs. 339,717 to Tshs. 3,918,609 (about 12 times) due to improved crop husbandry and associated economies of scale which will lower cost per unit significantly.

#### 4.1.2 *Revenue realization*

On average farmers harvest 143 kg of dry Rosella calyx per acre which is sold at 5,000 per kg. The income realised per acre is Tshs. 714,430 per season using traditional farming practices, with improved practices revenue increases to Tshs 6,012,053 (Table 4.1) an increase of 843%. In other counties (e.g. India, Indonesia), it is reported that Rosella yield ranges from 2.0 – 7.5 mt of wet weight under well advanced agricultural practices.

#### 4.1.3 *Trading and marketing costs of dry Rosella calyx and Moringa dry leafs*

According to information obtained from Kizota women group in Chalinze and field ITM officer in Kongowe, the main transaction costs in marketing of dry rosella calyx and Moringa are; buying price, handling costs (sorting and packaging and repacking), and transport cost. Transport is done by bus as luggage normally is not more than 50kg and transport is Tshs. 1,000 from Chalinze to Dar es Salaam.

#### 4.1.4 *Retailer Selling Prices of Rosella dry calyces*

*Consumption:* For the consumers there are no costs to be considered such as travelling to the market to buy the produce etc. They have only been asked to state the average price they pay on the market. The results are as follows:-

*Dar es Salaam market:* It was reported that retailer price by vendors or Kiosks is Tshs. 1,000. At Imalaseko supermarket it was observed that a 50gms pack sold at Tshs. 2,000.

*At farm gate (market):* According to farmers, a small proportion of Rosella and Moringa is sold to ITM (farmers at Mwambisi village in Kongowe) for 5,000 per kg of dried rosella calyx, the rest is sold to single local trader at the same rate. Local traders reported to sale dry calyx packed on 100gm for Tsh. 1,000 equivalent to Tshs. 10,000 per kg. The main market is Mailimoja town in Kibaha and Dar es Salaam. Women farmers (Kizota farmers group) of Rosella in Chalinze reported that dried Rosella calyx is packed at 50gms and sold at Tshs. 1,000 (equivalent to Tshs 20,000 per kg). Main markets are Dar es Salaam, Arusha and Moshi. Moringa leafs are sold wet at Tshs 3,600 per kg and dried by Phatonic Alphara company located in Chalinze.



The company owner reported that he was forced closed down his company due to low supply from contracted out growers failed to fulfil their production obligations.

*Table 4.1 Price Build up of Kiosks/ Vendors and Super Markets*

<b>Markets</b>	<b>Rosella calyx (kg dried weight)</b>	<b>Price changes of VC</b>
<b><i>Farm gate</i></b>		
Farmers cost	2,649	
Farmers selling price (SP)	5,000	
<b>% Change of Value</b>	<b>2,351</b>	<b>47%</b>
<b><i>Kiosks/ Vendors</i></b>		
Buying price	5,000	
Selling price (SP)	10,000	
<b>% Change of Value</b>	<b>5,000</b>	<b>100%</b>
<b><i>Super market - Imalaseko</i></b>		
Buying price	10,000	
Selling price (SP)	20,000	
<b>% Change of Value</b>	<b>10,000</b>	<b>100%</b>

Source: Field Survey July 2008

Calculation in Table 4.2 shows that the local trader earning is 100% of farm gate prices and the same is for supermarkets while has a farmer, gross margin is 47% of selling price.

## 4.2 Value of Morizella Juice from Farm gate to Retail Market

Morizella juice is extracted from Moringa leaves and Rosella calyces. One kg of dry Rosella and Moringa leaves produces 100 liters of juice. The volume of one bottle is 300ml which is equivalent to 333.33 bottles of Morizella juice. Table 4.2 illustrate the price changes at different level of Value chain.

*Table No. 4.2 Value of Morizella Juice from Farm Gate to Retail Market*

<b>Item</b>	<b>Price (Tshs)</b>	<b>% Price change</b>
Farm level:		
Price of 1 Kg dw ( rosella & Moringa) (Tshs)	5,000	
Cost of 1 kg dw at farm level	2,649	53%
Price of 1 Kg dw change at farm level		
ITM - Juice Manufacturing Plant		
Ex factory Price of juice 1 bottle = 500/=		
Ex factory Price of juice from 1kg dw (= 333.3 bottles)	166,650	
Price change from Farm gate to ITM (	161,650	3233 %
Retailer :		
Retail price per bottle = Tshs 1000	1'000	
Price of juice from 1kg dw retailer gate (=333.3 bottles)	333,300	
Price change from ITM ex -price to Retailer	166,650	50%

Source: Field Survey July 2008

Table 4.2 illustrates the incremental value of Moringa and Rosella along the chain. The price of kg of dry rosella is Tshs 5,000/= at farm level while through processing into juice its value (price) increases to Tshs 166,650/= (3,233%) of price change from farmers level. The retailer value (price) is Tshs 333,333/= equivalent to 50% change of ex- factory prices.

## 5.0 VALUE CHAIN GOVERNANCE

The analysis of governance aims at investigating the rules and power among different actors. Governance is a broad concept, which encompasses the system of coordination, organization and controls that preserve and enhance the generation of value along the chain. In this respect, governance implies that interactions are not random, but are organized in a system that allows meeting specific requirements in terms of products, processing and logistics. The analysis of value chain governance and services is best approached by separating three dimensions; rules and regulations, enforcement and services.

Rules and regulation governing Morizella value chain in study area is generally underdeveloped. The dominant channels (99%) are channel 1 and 5 where products traded directly either from farm gate (dry rosella calyx & dry Moringa leaf) or from ITM manufacturing plant to consumer in urban markets. Insignificant volume is trade to supermarkets, dispensaries/ clinic. No records for export of Morizella juice and related products. It was reported by Photonic Alphara Company manager that, Moringa powder and oil essentials used to be exported to Europe by Optma Africa before its closure in 2003. He also reported that Scandinavian Investment used to produce cooking oil for export. This company was closed after 6 months of operations due to lack of seed. Dry Rosella calyces are reported to be exported by company based in Morogoro.

In general, Morizella juice and related product markets organization/ or coordination are characterised by the following interrelated linkages:

**Lack of Governance:** There is underdeveloped governance mechanism in the Morizella value chain. Actors of this value chain operate in an un-coordinated and un-organized way. No rules exist among value chain actors. If this situation is un-arrested will negatively impacts on the generation of value coordination among existing chain participants.

**Market Coordination:** most of transaction take place in spot markets. No contracts prevails between manufacturer and trader neither consumers. No vertical or horizontal integration among actors. Farmers reported that ITM 10 farmers under out grower's scheme. According to farmers the contract is yet. It was also reported that in 2000 Optimal of Africa Ltd entered into contract with Moringa farmers in Chalinze but this arrangement did not work. One of the reasons given was that farmers failed to adhere to contract obligations on production supply. As a result the company operated only for three years (2000 – 2003). Coordination is also poor because there is no information sharing between producer and consumers, as well as traders and retailers and consequently the price is not determined by market force but is set by producers.

## **6.0 ENABLING ENVIRONMENT / REGULATORY FRAMEWORK**

Morizella Juice value chain is generally unregulated with no government policy interventions to date and so far both Rosella and Moringa sub sectors which is main source of raw materials are also unregulated and tax free. The existing regulations are as indicated below.

### **6.1 Seed Multiplication Policy**

Seed industry reform occurred in 1994 and seed production structure was simplified, gave more rights to research stations, private companies and individual farmers and thus reduced costs. Tanzanian law now allows and encourages seed to be produced at village level under what is termed Quality Declared Seed (QDS). This approach of Community Based Seed Production (CBSP) has resulted in lower prices to farmers for horticultural seeds of vegetables, greater availability of the seeds. Proper training to rosella and Moringa farmers is needed.

### **6.2 Tanzania Bureau of Standards (TBS) and Tanzania Food and Drug Authority (TFDA)**

Many SMEs including Morizella Juice and related products are faced with products registration and certification problem particularly in Tanzania Food & Drugs Authority (TFDA) and Tanzania Bureau of Standards (TBS). There is a need for simplification of business licensing, registration, and import/export procedures, as well as improvement of commercial dispute resolution. Apparently producers, farmers, traders, and consumers are to the large extent not aware of existing laws and regulations and their implications and thus do not comply.

### **6.3 Agricultural Products Quality and Standards**

Agricultural production is characterized by poor adherence to product standards and grades and inadequate post harvest management skills. Tanzanian farmers' find it difficulty to adhere to food hygiene and sanitary and phytosanitary (SPS) requirements this adversely affects the exporting and marketing of agricultural products. To address these shortcomings, the Ministry of Agriculture, Food Security and Cooperatives (MAFC) has ongoing interventions, packaging services with identification and traceability systems, and establishing accreditation systems as well as introduction of fair competition commission (FCC). Adherence to SPS requirement is important for future export preparations of Morizella juice and related products (i.e. Rosella and Moringa related products produced are for exports markets).

## **7.0 CONSTRAINTS AND OPPORTUNITIES IN MORIZELLA VALUE CHAIN**

Constraints refer to factors that inhibit medium and small scale enterprises (MSEs) in a given sub sector from performing their business in the best way. Opportunities refer to the prospects of businesses that can be undertaken as part of resolving those constraints. Thus behind every constraint there is an opportunity or opportunities for business. Thus, against each of the sub sector constraints listed below there are opportunities for commercial business for the profit motivated enterprises as well as facilitative services for the non-profit motivated agencies in Morizella juice value chain.

### **7.1 Opportunities**

Opportunities or favourable factors in the Morizella Value Chain that can render the sub-sector to grow and improve income and employment for medium small-scale enterprises (MSEs) are on both sides that is Demand (market) and Supply (production) as follows:

#### **7.1.1 Demand side**

- Presence of strong imports signals the industry potentials. The market for food supplements in Tanzania could be in the region of USD 1.6 million.
- Potential consumptions estimates is about 20million litres per annum
- Increased knowledge about the importance (usefulness) of the product in the general public,
- It has been estimated that uptake for low income will be 2% of the population, 5% for middle income and 3% for higher income.
- High local content of the product making it competitive in terms of cost.
- Consumption growth; by 2015, it is projected that about 36 million litres of juice will be consumed in Tanzania

#### **7.2.2 Supply Side**

- The availability of land for expansion, suitable climatic conditions and possibility for irrigation, which provides an opportunity to produce a Moringa and rosella products throughout the year;
- The significant part practice of producing organic products, which may interest international buyers;
- The installation of a centralised larger drying capacity will streamline quality and flow of inputs;
- Strengths of ITM and goodwill of ITM and availability of donor support.

## **7.2 Constraints**

### **7.2.1 *Research and Development***

Small scale farmers lack access to appropriate skills and machinery (technologies) which decreases their yield

### **7.2.2 *Production and harvest***

- Though not very prevalent, there can be incidence of pests and diseases, resulting in low productivity and supply;
- Poor and unreliable rain fall in the area though not common, may affect some areas;
- Insufficient knowledge on organic farming. ( organic farming is by default not by design);
- Insufficient quality control at farm level;
- Lack of knowledge on farming as a business; and
- Lack of knowledge on contract farming.

### **7.2.3 *Marketing Access***

- Lack Rosella and Moringa production and trade statistics necessary for analysis and planning;
- Lack of relevant market and price information to farmers;
- Poor packaging materials of Morizella Juice in terms of bottle, label and labelling so as to attract consumer at decision making of whether to buy or not.

### **7.2.7 *Policy and Regulation***

- Lack of serious policy support to the Rosella and Moringa sub-sector, in most cases treating it as a new product (i.e. unknown);
- Bureaucratic and costly procedures for Government business licensing and TBS Product certification procedures.

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

### 8.1 Conclusion

The assumption is that value chains are driven by market forces due to the absence of state intervention in the economy of manufactured and agricultural commodity markets. However, Morizella juice value chain is observed to be diverting from this assumption as it is not driven by prices but with the intrinsic value of the product in terms of nutritional and medicinal values.

### 8.2 Recommendations

**i. Marketing Access:** Market for Morizella has been extensively addressed in the market study submitted along with this value chain analysis, the market for Morizella juice will open up the market for Moringa leaves and Rosella calyx. The estimates show that demand for inputs needs about 200 acres of land which is not a serious constraint in the Coastal Region. The study recommends that ITM should explore technology for concentrates or powder Morizella apart from juice. Also there are recommendations on packaging, distribution, pricing and promotion.

**ii. Poor farming practices:** It is recommended that farmer groups involved in Moringa and Rosella should be strengthened in advance in order to minimize lead time between commissioning of production and supply of raw materials. In order for the business to help farmers to improve their incomes yield should be improved. There is possibility for farmers to produce eight times of what they harvest at present. This implies farmers can earn 8 times more from the same land if they use recommended farming practices.

**iii. Limited Education of Organic Farming:** The marketing catch for Morizella juice is being organic, is an asset that can earn premium price and afford export markets for organic products. Certifications of organic products requires strict adherence to established procedures. It is important that farmers are well educated, supervised and controlled to qualify for the status. This is critical when the number of farmers has increased and farming area expanded. Also integrated pest management need to be strengthened.

**iv. Weak farmers groups:** Related to the points above, it is necessary to mobilize and build capacity of the groups especially in group dynamics, group leadership and business management.

**v. Lack of input from research institutions:** There is a need to attract the interest of research institutions such as Sokoine University of Agriculture or Kibaha Sugar Research Institute to be mainstreamed in the Morizella value chain.

**Table No 8. Recommendations for Interventions**

Issue	Constraint/ opportunities	Intervention suggested	Entry Points / actors concerned	Expected outcome	Time frame
R & D and services	<ul style="list-style-type: none"> <li>• Lack of research institutions on development of rosella and Moringa sub sector development in the country.</li> <li>• Small scale farmers lack access to appropriate tools and machinery (technologies) which decreases their yield, also there is low capacity of Morizella juice manufacturing factory.</li> </ul>	<ul style="list-style-type: none"> <li>• Co-opting research institutions to include Moringa and rosella products in their activities.</li> <li>• Encourage local equipment manufacturer to produce appropriate machinery and offering on sport market (direct sale) or leasing arrangement.</li> <li>• Engage rosella and Moringa crops in districts development plans.</li> </ul>	<ul style="list-style-type: none"> <li>• Preferable institutions; SUA and Kibaha Sugar research institution</li> <li>• University of DSM – engineering department</li> <li>• District Agricultural Development Plans (DADPS)</li> </ul>	<ul style="list-style-type: none"> <li>• Access to improved and reliable seeds</li> <li>• Access to appropriate equipment on leasing or sport market</li> <li>• Government involvement in development and promotion</li> </ul>	<ul style="list-style-type: none"> <li>• Medium ( 2 – 3 years)</li> <li>• Short ( 1-2 years)</li> <li>• Short ( 1-2 years)</li> </ul>
Production & farmers organization	<ul style="list-style-type: none"> <li>• Incidence of pests and diseases, resulting in low productivity and supply.</li> <li>• Poor and unreliable rain fall in the area</li> <li>• Insufficient knowledge on organic farming. ( organic farming is by default not by design)</li> <li>• Insufficient quality control at farm level</li> <li>• Weak farmers groups: inability of farmers to organize for economies of scale limits their opportunities to</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness creation on Training on good agricultural practices</li> <li>• Introduction of Irrigation schemes</li> <li>• Training on organic farming to farmers groups</li> <li>• Training in business skills, record keeping and crop husbandry.</li> <li>• Training on basics of quality control &amp; safety at farm level</li> </ul>	<ul style="list-style-type: none"> <li>• Government (ministry of Industry, Trade and Marketing) Interested NGOs</li> <li>• DALDOs offices and interested NGOs</li> <li>• ITM in collaboration with government extension department at district level</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness creation on how to combat plant pest and disease.</li> <li>• Establishment of small scale irrigation farming schemes</li> <li>• Awareness that agriculture is business, record keeping, development of simple business plans</li> </ul>	<ul style="list-style-type: none"> <li>• Short ( 2 -3 years)</li> <li>• Short ( 2-3 years)</li> <li>• Short ( 1-2 years)</li> </ul>



Issue	Constraint/ opportunities	Intervention suggested	Entry Points / actors concerned	Expected outcome	Time frame
	access large number of markets • Poor business skills and lack of leadership capacity of market association managers and lack of knowledge regarding market potential and requirements.	• Strengthening farmers groups			• Short (1-2) years)
Market access	• Lack rosella and Moringa production and trade statistics necessary for analysis and planning. • Lack of relevant market and price information, especially to farmers • Insufficient packaging materials of at farm level.	• Provision of information • Provision of market and price information to farmers and consumers. • Access to better packaging materials	• ITM in collaboration interested actors (e.g. NGOs and DALDOs)	• Availability of statistics on production, processing, marketing information • Availability of price information to consumers and farmers	• Short (2-3 years)
Finance	• Lack of credit schemes at farm	• Facilitation establishment of credit arrangement to farmers	• Farmers	• Availability of funds	• Short (2-3 years)
Policy & Regulations	• Lack of serious policy support to the rosella and Moringa sub-sector. • Bureaucratic and costly procedures for Government business licensing and TBS Product certification procedures.	• Awareness creation in partnership with public – private actors • Strengthening (Public – private partnership)	• ITM in collaboration with DALDOs and other interested actors	• Rosella and Moringa crops to be added to Development Plans at District level. • Easy access to national standards of quality and safety.	• Medium ( 3-5 years) • Medium ( 3-5 years)

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**Annex I*****Detailed impact of Drying Factory in Morizella Value Chain per year***

Item	Ha	Acre	Number Actors
Land required for day's dryer capacity	1.86	4.08	
Land required for annual dryer capacity	<b>557</b>	<b>1,225</b>	
Yield - Wet calyx	<b>799</b>	<b>363</b>	Smallholder 650, medium 50, large 10
Weight Ratio (dw	16.8%		
Dry flower	134.67	61	Dryer owners/operators--
Farm gate price per kg of dry calyx	5,000	5,000	
Litre per Kg	1000	1,000	
Litres of Juice per unit of land	134,670	61,214	
<b>Dryer capacity in Kgs</b>	500	500	Juice Formulation/Production ... workers
Process period in days	2	2	
Operating days per year	300	300	
Capacity per day of kg wet weight	250	250	
Capacity per day of kg dry weight	42	42	
Litres juice of wet weight	250,000	250000	
Litres juice of dry weight	42,000	42,000	
Juice manufacturing & bottling	750,000	750	Bottling plant owners/workers ....
Bottling 300ml ( 3.33bottles per litre) / day	138600	138600	
Ex factory price per bottle	500	500	
<b>Revenue</b>	69,300,000.	69,300,000	
Distributors (Short Channel Option - Refer to Market Study)			
Zonal distributors (wholesalers) Phase I Dar Zone, Coast Zone (Moro, Dodoma, Coast, Lindi and Mtwara) Northern Zone (Tanga, Kili, Aru and Many) - 3 zonal agents			
Retailers - pharmacies			100

## Annex II

**Gross Margin Analysis of Rosella Production per Acre 2006/07**

Activity	Traditional	Improved Methods	% increase
Na. of plants / acre	4,489	4,489	
Yields per plant (kg ww)	0.2	1.5	843
<b>Total yield (kg ww)</b>	<b>799.0</b>	<b>6,733.5</b>	
Conversion rate (ww:dw)	5.6	5.6	
Total yield (kg dw)	142.7	1,202	
Price of dw / kg	5,000	5,000	
<b>Total Income</b>	<b>713,430</b>	<b>6,012,053</b>	<b>843</b>
<b>Average Production Costs</b>			
land preparation	30,000	30,000	
De-stumping	80,000	80,000	
Ploughing (tractor)	35,000	35,000	
Harrowing	35,000	35,000	
Planting	15,000	15,000	
Fertilizer & pesticides	-	200,000	
Weeding 2 X (@ 20,000	40,000	80,000	
Harvesting @ 50/= per kg ww	39,952	336,675	
De-husking @ 100/= per kg ww	79,904	673,350	
Drying 2 X @ 3000 per day/ acre	18,000	601,205	
Packaging material 3 @ 300	856.	7,214	
<b>Total costs</b>	<b>373,712</b>	<b>2,093,445</b>	<b>560</b>
<b>Gross margin</b>	<b>339,718</b>	<b>3,918,609</b>	<b>1,153</b>

Source: Field Survey July 2008